

KNI-159-A

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Matsuda et al.
Serial Number: Unknown
U.S. Filing Date: Concurrently Herewith
Group Art Unit: Unknown
Examiner: Unknown
Title: **LASER OSCILLATOR AND LIGHT SCATTERING PARTICLE DETECTOR
USING THE SAME**

PRELIMINARY AMENDMENT-A

Box Patent Applications
Assistant Commissioner for Patents
U.S. Patent and Trademark Office
P.O. Box 2327
Arlington, VA 22202

Sir:

In connection with the above-identified new application (filed concurrently herewith), please
amend the above-identified application as follows:

IN THE SPECIFICATION

Please replace the hand-corrected specification with the substitute specification provided
herewith (including clean replacement pages and hand-marked up copies of the original text showing
the changes).

IN THE ABSTRACT

Please revise the abstract as indicated on the appended pages (including a clean replacement
page and a hand-marked up copy of the original text showing the changes).

IN THE CLAIMS

Please amend original claims 1-3, 6, 7-10, 13-15 and 17 as indicated on the appended pages

(including clean replacement pages and hand-marked up copies of the original text showing the changes). Cancel original claims 4, 5, 11, 12 and 16, without prejudice and without dedication or abandonment of the subject matter thereof.

REMARKS

Upon entry of the present amendment, the claims in the application are claims 1-3, 6-10, 13-15 and 17, of which claims 1, 2, 7 and 10 are independent.

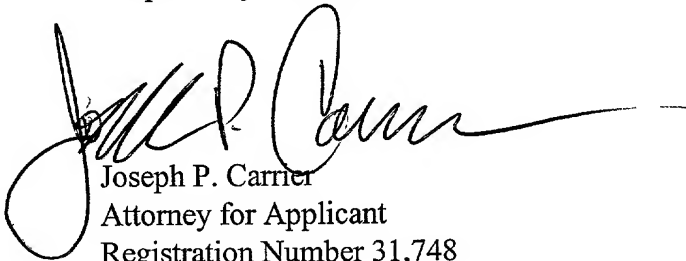
The present preliminary amendment is being voluntarily submitted prior to examination in order to correct minor grammatical errors in the specification, claims and abstract, to include more proper idiomatic form, and to eliminate multiple dependencies in the claims. Applicant respectfully submits that all of the amendments are fully supported by the original disclosure.

Favorable consideration is respectfully requested.

Respectfully submitted,

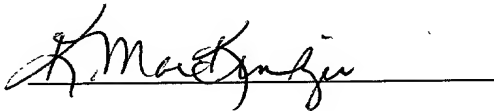
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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as Express Mail Certificate No. EL699973712US in an envelope addressed to Box Patent Application Assistant Commissioner of Patents, U.S. Patent and Trademark Office, P.O. Box 2327, Arlington, VA 22202 on January 24, 2002.



1 1. (Amended) A laser oscillator, comprising:

2 a semiconductor laser for generating a pumping laser light;

3 a laser medium for receiving said pumping laser light and for generating an

4 attained laser light, said laser medium having an optical axis; and

5 a concave mirror for reflecting pumping laser light from said semiconductor laser

6 to said laser medium; [in which laser light is irradiated by pumping a laser medium

7 using pumping laser light generated from a semiconductor laser,]

8 wherein said pumping laser light generated from said semiconductor laser is

9 condensed to irradiate upon said laser medium [with a] by said concave mirror, and

10 wherein the [core axis of] said pumping laser light which is reflected [on] by said

11 concave mirror has a core axis which forms a predetermined non-linear angle with

12 respect to the optical axis of said laser medium.

1 2. (Amended) A light scattering [type] particle detector [, using a semiconductor
2 laser as a light source,] for detecting particles contained in sample fluid which defines a
3 flow path, said particle detector comprising a semiconductor laser and a concave mirror,
4 wherein laser light generated from said semiconductor laser is condensed to
5 irradiate upon said flow path with [a] said concave mirror and thereby a particle detecting
6 region is defined.

1 3. (Amended) [A] The light scattering [type] particle detector of claim 2, [using
2 a semiconductor laser as a light source, for detecting particles contained in sample fluid
3 which defines a flow path, wherein laser light generated from said semiconductor laser is
4 condensed to irradiate upon said flow path with a concave mirror and] further comprising
5 a condenser lens having an optical axis, [and thereby a particle detecting region is
6 defined,] and wherein the core axis of said laser light which is reflected [on] by said
7 concave mirror has a predetermined non-linear angle with respect to the optical axis of

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8 said condenser lens.

1 6. (Amended) [A] The light scattering [type] particle detector of claim 2, [in
2 which said laser light irradiated from said laser oscillator according to claim 5 is
3 condensed to irradiate upon a flow path defined by sample fluid, and thereby a particle
4 detecting region is defined,]
5 wherein particles contained [wherein being] in said particle detecting region may
6 be detected by receiving scattered light generated by said laser light.

1 7. (Amended) A light scattering [type] particle detector comprising:
2 a semiconductor laser for generating pumping laser light;
3 a laser medium for being pumped by said pumping laser light;
4 a reflecting mirror on which laser light irradiated from said laser medium is
5 reflected;

6 a flow path defined by sample fluid and being provided between said laser
7 medium and said reflecting mirror; and
8 a particle detecting region defined by irradiating said laser light to the flow path,
9 said light scattering [type] particle detector being adapted for detecting particles
10 contained in said particle detecting region by receiving scattered light generated by said
11 laser light,
12 wherein the optical axis of said laser medium and the optical axis of said
13 reflecting mirror are allowed to coincide with each other and a setting angle adjusting
14 means is provided for adjusting setting angles of said laser medium and said reflecting
15 mirror with respect to a setting block for each so as to make the optical axes intersect said
16 flow path.

1 8. (Amended) A light scattering [type] particle detector according to claim 7, wherein
2 said setting angle adjusting means comprises:

3 a laser medium setting member to which said laser medium is fixed, the setting

4 angle of which laser medium setting member is adjustable with respect to said setting

5 block for the laser medium;

6 a reflecting mirror setting member to which said reflecting mirror is fixed, the

7 setting angle of which reflecting mirror setting member is adjustable with respect to said

8 setting block for the reflecting mirror; and

9 elastic members which are interposed between said laser medium setting

10 member and said setting block for the laser medium and between said reflecting mirror

11 setting member and said setting block for the reflecting mirror.

1 9. (Amended) A light scattering [type] particle detector according to claim 8, wherein said

2 elastic members are O-rings comprised of rubber.

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10. (Amended) A laser oscillator, comprising:

a semiconductor laser for generating a pumping laser light;

a laser medium for receiving said pumping laser light and for generating an

attained laser light, said laser medium having an optical axis; and

a condensing lens for directing condensed pumping laser light from said

semiconductor laser to said laser medium;

[in which pumping laser light generated from a semiconductor laser is condensed
to irradiate upon a laser medium with a condenser lens, said laser medium is pumped, and
thereby laser light is irradiated,]

wherein a setting position adjusting means for said semiconductor laser is

provided for superposing the intensity distribution of said pumping laser light generated

from said semiconductor laser on the intensity distribution of said laser light irradiated

from said laser medium.

1 13. (Amended) A light scattering [type] particle detector in which said laser light
2 irradiated from said laser oscillator according to claim 10 [any one of claims 10, 11 and
3 12] is directed to a flow path defined by sample fluid, and thereby a particle detecting
4 region is defined, particles contained in which particle detecting region are detected by
5 receiving scattered light generated by irradiating said laser light onto said particles.

1 14. (Amended) [A] The laser oscillator of Claim 10, [in which pumping laser
2 light generated from a pumping light source is condensed to irradiate upon a solid-state
3 laser with a condenser means and laser light irradiated from said solid-state laser is
4 allowed to reflect back to said solid-state laser from a reflecting means,] wherein said
5 [condenser means] condensing lens has a surface having different radii of curvature in the
6 parallel direction and the perpendicular direction with respect to the flow path.

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1 15. (Amended) [A] The laser oscillator of Claim 14, [in which pumping laser
2 light generated from a pumping light source is condensed to irradiate upon a solid-state
3 laser with a condenser means and laser light irradiated from said solid-state laser is
4 allowed to go back to said solid-state laser by a reflecting means, wherein said reflecting
5 means has] further comprising a reflecting mirror having a surface having different radii
6 of curvature in the parallel direction and the perpendicular direction with respect to the
7 flow path.

1 17. (Amended) A light scattering [type] particle detector in which said laser light
2 irradiated from said laser oscillator according to claim 14 [any one of claims 14, 15 and
3 16] is directed to a flow path defined by sample fluid, and thereby a particle detecting
4 region is defined, and wherein particles contained in [which] said particle detecting
5 region are detected by receiving and analyzing scattered light generated by irradiating
6 said laser light on said particles.

1 1. (Amended) A laser oscillator, comprising:

2 a semiconductor laser for generating a pumping laser light;

3 a laser medium for receiving said pumping laser light and for generating an

4 attained laser light, said laser medium having an optical axis; and

5 a concave mirror for reflecting pumping laser light from said semiconductor laser

6 to said laser medium;

7 wherein said pumping laser light generated from said semiconductor laser is

8 condensed to irradiate upon said laser medium by said concave mirror, and wherein the

9 said pumping laser light which is reflected by said concave mirror has a core axis which

10 forms a predetermined non-linear angle with respect to the optical axis of said laser

11 medium.

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1 2. (Amended) A light scattering particle detector for detecting particles contained in
2 sample fluid which defines a flow path, said particle detector comprising a semiconductor
3 laser and a concave mirror,
4 wherein laser light generated from said semiconductor laser is condensed to
5 irradiate upon said flow path with said concave mirror and thereby a particle detecting
6 region is defined.

1 3. (Amended) The light scattering particle detector of claim 2, further comprising a
2 condenser lens having an optical axis, and wherein the core axis of said laser light which
3 is reflected by said concave mirror has a predetermined non-linear angle with respect to
4 the optical axis of said condenser lens.

1 6. (Amended) The light scattering particle detector of claim 2,

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2 wherein particles contained in said particle detecting region may be detected by
3 receiving scattered light generated by said laser light.

1 7. (Amended) A light scattering particle detector comprising:

2 a semiconductor laser for generating pumping laser light;

3 a laser medium for being pumped by said pumping laser light;

4 a reflecting mirror on which laser light irradiated from said laser medium is
5 reflected;

6 a flow path defined by sample fluid and being provided between said laser
7 medium and said reflecting mirror; and

8 a particle detecting region defined by irradiating said laser light to the flow path,

9 said light scattering particle detector being adapted for detecting particles

10 contained in said particle detecting region by receiving scattered light generated by said

11 laser light,

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12 wherein the optical axis of said laser medium and the optical axis of said
13 reflecting mirror are allowed to coincide with each other and a setting angle adjusting
14 means is provided for adjusting setting angles of said laser medium and said reflecting
15 mirror with respect to a setting block for each so as to make the optical axes intersect said
16 flow path.

1 8. A light scattering particle detector according to claim 7, wherein said setting
2 angle adjusting means comprises:
3 a laser medium setting member to which said laser medium is fixed, the setting
4 angle of which laser medium setting member is adjustable with respect to said setting
5 block for the laser medium;
6 a reflecting mirror setting member to which said reflecting mirror is fixed, the
7 setting angle of which reflecting mirror setting member is adjustable with respect to said
8 setting block for the reflecting mirror; and

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9 elastic members which are interposed between said laser medium setting
10 member and said setting block for the laser medium and between said reflecting mirror
11 setting member and said setting block for the reflecting mirror.

1 9. A light scattering particle detector according to claim 8, wherein said elastic
2 members are O-rings comprised of rubber.

1 10. (Amended) A laser oscillator, comprising:
2 a semiconductor laser for generating a pumping laser light;
3 a laser medium for receiving said pumping laser light and for generating an
4 attained laser light, said laser medium having an optical axis; and
5 a condensing lens for directing condensed pumping laser light from said
6 semiconductor laser to said laser medium;

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7 wherein a setting position adjusting means for said semiconductor laser is
8 provided for superposing the intensity distribution of said pumping laser light generated
9 from said semiconductor laser on the intensity distribution of said laser light irradiated
10 from said laser medium.

1 13. (Amended) A light scattering particle detector in which said laser light irradiated
2 from said laser oscillator according to claim 10 is directed to a flow path defined by
3 sample fluid, and thereby a particle detecting region is defined, particles contained in
4 which particle detecting region are detected by receiving scattered light generated by
5 irradiating said laser light onto said particles.

1 14. (Amended) The laser oscillator of Claim 10, wherein said condensing lens has a
2 surface having different radii of curvature in the parallel direction and the perpendicular
3 direction with respect to the flow path.

1 15. (Amended) The laser oscillator of Claim 14, further comprising a reflecting mirror
2 having a surface having different radii of curvature in the parallel direction and the
3 perpendicular direction with respect to the flow path.

1 17. (Amended) A light scattering particle detector in which said laser light irradiated
2 from said laser oscillator according to claim 14 is directed to a flow path defined by
3 sample fluid, and thereby a particle detecting region is defined, and wherein particles
4 contained in said particle detecting region are detected by receiving and analyzing
5 scattered light generated by irradiating said laser light on said particles.

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